

IN THE CLAIMS:

1. (Cancelled)

2. (Currently Amended) A semiconductor element having a semiconductor layer comprising a source area, a drain area, and a gate area, a gate insulating film, a source electrode, a drain electrode, and a gate electrode formed on said gate insulating film, formed on a substrate, wherein:

said gate electrode comprises:

two silicide films comprising upper and lower silicide thin films, one of said silicide thin films being a gate electrode serving also as an LDD forming mask formed in slight protrusion on at least the source electrode side and the drain electrode side of the other silicide thin film;

said semiconductor layer having:

~~an LDD area formed in an area corresponding to the gate electrode position determinable from the positions of said silicide thin film and said metal thin film and the injection direction of impurity ions because impurity ions are injected with said gate electrode serving also as an LDD forming said LDD forming mask as the injecting mask.~~

Serial No.: 10/608,000

3. (Currently Amended) A semiconductor element having a semiconductor layer comprising a source area, a drain area, and a gate area, a gate insulating film, a source electrode, a drain electrode, and a gate electrode formed on said gate insulating film, formed on a substrate, wherein:

said gate electrode is:

a multi-stage gate electrode serving also as a mask for forming an LDD, comprising a plurality of layers having at least a silicide thin film, a metal thin film and a silicon thin film, wherein an uppermost layer or a lowermost layer of said plurality of layers protrudes in a direction of at least one of the source electrode and the drain electrode of the other thin films, whereby the uppermost layer or the lowermost layer comprises a stage structure; which is, as a mask used when injecting impurities, the thickest at the center portion, the thinnest at both ends, and has a middle portion having a medium thickness, or which is thicker from the both ends toward the center portion; and

said semiconductor layer having:

a multi-stage LDD area formed at a position dependent on said mask thickness and the inducting direction of impurity

Serial No.: 10/608,000

ions, since impurity ions are injected from above with said gate electrode serving also as an LDD forming mask.

4. (Currently Amended) A semiconductor element having a semiconductor layer comprising a source area, a drain area, and a gate area, a gate insulating film, a source electrode, a drain electrode, and a gate electrode formed on said gate insulating film, formed on a substrate; wherein:

said gate electrode being:

an intermediate aluminum gate electrode serving also as an LDD mask, comprising a layer plurality of layers comprising a high-melting-point metal thin film;

a layer comprising a silicide thin film; and

a layer comprising an aluminum thin film ~~surreunded by located between~~ said high-melting-point metal thin film and said silicide thin film; ~~the mask thickness being the largest at the center portion and smaller toward the both ends thereof; film, wherein an uppermost layer or a lowermost layer of said plurality of layers protrudes in a direction of at least one of the source electrode and the drain electrode of the other thin films, whereby the uppermost layer or the lowermost layer comprises a stage structure, and~~

Serial No.: 10/608,000

said semiconductor layer being:

~~an LDD semiconductor element being:~~

an LDD semiconductor element having a single-stage or multi-stage LDD area formed at a position dependent upon the mask thickness and the injecting direction of impurities since impurity ions are injected from above, using said intermediate aluminum layer gate electrode serving also as an LDD mask as an injecting mask.

5.-9. (Cancelled)

10. (Withdrawn) A manufacturing method of a semiconductor element, comprising the steps of:

a basic forming step for forming a semiconductor layer at a prescribed position on a substrate and forming a gate insulating film on the thus formed semiconductor layer;

a gate electrode forming step for forming a gate electrode serving also as a mask for use upon injecting impurities, having a structure in which said gate electrode has at least one silicide thin film on the thus formed gate insulating film, and at least one of said thin films protrudes in a direction of at least one of the source electrode and the

Serial No.: 10/608,000

drain electrode of the other thin films, and when injecting impurities, the mask has the largest thickness at the center portion and gradually smaller thickness in the protruding direction in a direction of at least one of the source electrode and the drain electrode; and

an injecting step for forming a semiconductor layer having an LDD structure comprising, when injecting impurity ions into said semiconductor layer, using the thus formed gate electrode as an injecting mask, a source area and a drain area having a large amount of injection of impurity ions because of the non-existence of a mask, an LDD area having a small amount of impurity ion injection because only the protruding portion serves as a mask, and a channel area having no injection of impurity ions because all the thin films serve as masks.

11. (Cancelled)

12. (Withdrawn) A manufacturing method of a semiconductor element according to claim 10, comprising the step of:

a gate insulating film partial removing step for once removing said gate insulating film except for a portion

Serial No.: 10/608,000

positioned at a lower portion of said gate electrode prior to said injecting step; and

a gate insulating film re-forming step for re-forming a gate insulating film on the portion where the gate insulating film has once been removed, after the completion of said injecting step.

13. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure in which patterns are arranged on a substrate, comprising the step of:

a lower gate electrode forming step for forming a lower gate electrode having a prescribed shape on a gate insulating thin film formed on a patterned semiconductor layer on the substrate;

an upper gate electrode forming step for forming an upper gate electrode in close contact with the lower electrode gate so that the gate electrode has a shape having a side poorer in masking ability upon injecting impurities as compared with the center portion at least at an end on the source electrode side and the drain electrode side by use of the lower gate electrode formed as above; and an impurity injecting step for

Serial No.: 10/608,000

injecting impurities onto said semiconductor layer by use of the gate electrode, as a mask, which would have a side poorer in masking ability as compared with the center portion at least at an end on said source electrode side and said drain electrode side in the aforementioned step.

14. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure in which patterns are arranged on a substrate, comprising the step of:

a lower gate electrode forming step for forming a lower gate electrode having a prescribed shape on a gate insulating thin film formed on a patterned semiconductor layer on the substrate;

an impurity light injecting step for lightly injecting impurities onto said semiconductor layer, using the thus formed lower gate electrode as a mask;

an upper gate electrode forming step for forming an upper gate electrode having a portion protruding on at least one side of the source electrode side and the drain electrode side on, and in close contact with, said lower gate electrode after the completion of said impurity light injecting step; and

Serial No.: 10/608,000

an impurity injecting step for injecting impurities onto said semiconductor layer, by using, as a mask, the gate electrode of the upper/lower two-stage structure, formed in said lower gate electrode forming step and said upper gate electrode forming step.

15. (Withdrawn) A manufacturing method of a thin-film semiconductor element having a top gate type LDD structure according to claim 13, wherein:

said upper gate electrode forming step is:  
a mask forming step of LDD using plating of depositing a prescribed metal by plating with the lower gate electrode as an electrode.

16. (Withdrawn) A manufacturing method of a thin-film semiconductor element having a top gate type LDD structure according to claim 15, wherein:

said mask forming step of LDD using plating is a mask forming step for LDD using a prescribed plating carried out by electrolytic plating or non-electrolytic plating.

Serial No.: 10/608,000

17. (Withdrawn) A manufacturing method of a thin-film semiconductor element having a top gate type LDD structure according to claim 13, wherein:

said upper gate electrode forming step has:

an etching sub-step for simultaneously etching the upper gate electrode forming film and the lower gate electrode forming film formed in close contact with each other into the shape of the lower gate electrode; and

an anode oxidizing sub-step for anode-oxidizing the etched upper gate electrode forming film.

18. (Withdrawn) A manufacturing method of a thin-film semiconductor element having a top gate type LDD structure according to claim 13, wherein:

said upper gate electrode forming step comprises:

a mask forming step for LDD using reaction causing a reaction by exposing the lower gate electrode to a prescribed material and forming a side comprising a lower-density compound generated by the reaction on at least one of the source electrode wide and the drain electrode side.

Serial No.: 10/608,000

19. (Withdrawn) A manufacturing method of a thin-film semiconductor element having a top gate type LDD structure in which patterns are arranged on a substrate, comprising the steps of:

a lower gate electrode forming step for forming a lower gate electrode having a prescribed shape on the gate insulating film formed on the semiconductor layer patterned on the substrate;

an upper gate electrode forming step for forming an upper gate electrode so that at least one of the ends of the lower gate electrode on the source electrode side and the drain electrode side protrudes, by using at least photolithography and etching, on the thus formed lower gate electrode; and

an impurity injecting step for injecting impurities onto said semiconductor layer, using, as a mask, the gate electrode having a side poorer in masking ability as compared with the center portion on at least one of said source electrode side and the drain electrode side through the two aforementioned steps.

Serial No.: 10/608,000

20. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure in which patterns are arranged on a substrate, comprising:

a lower gate electrode forming step for forming a lower gate electrode of a prescribed shape on a gate insulating film formed on a semiconductor layer patterned on a substrate;

an impurity light injecting step for lightly injecting impurities onto said semiconductor layer by use of the thus formed lower gate electrode as a mask;

an upper gate electrode forming step for forming an upper gate electrode, in close contact, so that at least one of the ends of the lower gate electrode on the source electrode side and the drain electrode side protrudes, by using at least any of photolithography and etching, on said lower gate electrode, after the completion of said impurity light injecting step; and

an impurity injecting step for injecting impurities onto said semiconductor layer by using the gate electrode having the upper and lower two-stage structure as a mask formed in said lower gate electrode forming step and said upper gate electrode forming step.

Serial No.: 10/608,000

21. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 13, comprising:

a gate insulating film removing step for once removing the gate insulating film under the gate electrode of the two-stage structure used as a mask prior to said impurity injecting step after the completion of said upper gate electrode forming step; and

a gate insulating film re-forming step for forming again a gate insulating film on the semiconductor layer at the portion where said gate insulating film has been removed after said impurity injecting step.

22. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 15, comprising:

a gate insulating film removing step for once removing the gate insulating film under the gate electrode of the two-stage structure used as a mask prior to said impurity injecting step after the completion of said upper gate electrode forming step; and

Serial No.: 10/608,000

a gate insulating film re-forming step for forming again a gate insulating film on the semiconductor layer at the portion where said gate insulating film has been removed after said impurity injecting step.

23. (Withdrawn) A manufacturing method of a thin film semiconductor element of a top gate type LDD structure according to claim 21, comprising:

a hydrogen adsorptive metal film forming step for forming a hydrogen adsorptive metal film having a prescribed thickness on the semiconductor layer after said gate insulating film removing step;

a hydrogen adsorptive metal film removing step for removing the hydrogen adsorptive metal film formed on said semiconductor layer except for the source electrode portion and the contact electrode portion, prior to said gate insulating film re-forming step after said impurity injecting step; and

a hydrogen adsorptive metal film using contact hole forming step for using said remaining hydrogen adsorptive metal film when forming the contact hole in the both electrode

Serial No.: 10/608,000

forming sections on said re-formed gate insulating film for forming a source electrode and a drain electrode.

24. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 13, comprising:

an electrode unnecessary portion removing step for removing the protruding portion of a side of any of the upper gate electrode or the lower gate electrode from the other electrode on the source electrode side and the drain electrode side by said mask forming step for the LDD portion, or said lower gate electrode forming step and the upper electrode forming step, after the completion of said impurity injecting step.

25. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 15, comprising:

an electrode unnecessary portion removing step for removing the protruding portion of a side of any of the upper gate electrode or the lower gate electrode from the other electrode on the source electrode side and the drain electrode

Serial No.: 10/608,000

side by said mask forming step for the LDD portion, or said lower gate electrode forming step and the upper electrode forming step, after the completion of said impurity injecting step.

26. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 21, comprising:

an electrode unnecessary portion removing step for removing the protruding portion of a side of any of the upper gate electrode or the lower gate electrode from the other electrode on the source electrode side and the drain electrode side by said mask forming step for the LDD portion, or said lower gate electrode forming step and the upper electrode forming step, after the completion of said impurity injecting step.

27. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 23, comprising:

an electrode unnecessary portion removing step for removing the protruding portion of a side of any of the upper

Serial No.: 10/608,000

gate electrode or the lower gate electrode from the other electrode on the source electrode side and the drain electrode side by said mask forming step for the LDD portion, or said lower gate electrode forming step and the upper electrode forming step, after the completion of said impurity injecting step.

28. (Withdrawn) A manufacturing method of a thin film semiconductor having a bottom gate type LDD structure, patterned on a substrate, comprising:

a gate electrode forming step for forming a prescribed gate electrode patterned on the substrate;

an upper element composing layer forming step for sequentially forming a gate insulating layer, a patterned semiconductor layer and/or an underlayer insulating layer on the thus formed gate electrode;

a main mask forming step for forming a main mask directly on said gate electrode of the uppermost layer formed in said upper element composing layer forming step;

an upper mask forming step for forming a side poorer in masking ability upon injecting impurities as compared with the center portion on at least one end of the source electrode

Serial No.: 10/608,000

side and the drain electrode side, by use of the thus formed main mask; and

an impurity injecting step for injecting impurities onto said semiconductor layer from above, by using the thus formed main mask and the upper mask as masks.

29. (Withdrawn) A manufacturing method of a thin film semiconductor having a bottom gate type LDD structure, pattern-arranged on a substrate, comprising:

a gate electrode forming step for forming a prescribed gate electrode patterned on the substrate;

an upper element composing layer forming step for sequentially forming a gate insulating layer, a patterned semiconductor layer and/or an underlayer insulating layer on the thus formed gate electrode;

a main mask forming step for forming a main mask directly on said gate electrode of the uppermost layer formed in said upper element composing layer forming step;

an impurity light injecting step for lightly injecting impurities onto said semiconductor layer by using the thus formed main mask as a mask;

Serial No.: 10/608,000

an upper mask forming step for forming, in close contact with said main mask, an upper mask having a portion protruding on at least one end of the source electrode side and the drain electrode side, by using the thus formed main mask after the completion of said impurity light injecting step; and

an impurity injecting step for injecting impurities onto said semiconductor layer, by using said main mask and the upper mask as masks.

30. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 28, wherein:

said main mask forming step comprises:

a photosensitive resin layer forming sub-step for forming a photosensitive resin layer further on the uppermost layer formed in said upper element comprising layer forming step;

a gate electrode corresponding exposing sub-step for irradiating an electromagnetic wave of a short wavelength from the side of the substrate having said photosensitive resin layer formed thereon with said gate electrode as a mask to prevent the portion of the photosensitive remain corresponding to said gate electrode from being exposed; and

Serial No.: 10/608,000

a photosensitive resin non-exposure use main mask forming sub-step for forming said main mask by using the portion not exposed of said photosensitive resin in said gate electrode corresponding exposing sub-step, irrespective of whether the portion not exposed of said photosensitive resin is used as it is or another material is used for forming.

31. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 28, wherein:

said main mask forming step uses a metal as a main mask;  
and

said upper mask forming step is a plating-using upper mask forming step for depositing a prescribed metal by plating, using the main mask as one of the electrodes.

32. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 30, wherein:

said main mask forming step uses a metal as a main mask;  
and

Serial No.: 10/608,000

said upper mask forming step is a plating-using upper mask forming step for depositing a prescribed metal by plating, using the main mask as one of the electrodes.

33. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 28, wherein:

said upper mask forming step is:

a reaction-using upper mask forming step for forming a side comprising a low-density compound, produced by exposing the main mask to a prescribed article to cause a reaction, on at least one of the source electrode side and the drain electrode side thereof.

34. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 30, wherein:

said upper mask forming step is:

a reaction-using upper mask forming step for forming a side comprising a low-density compound, produced by exposing the main mask to a prescribed article to cause a reaction, on

Serial No.: 10/608,000

at least one of the source electrode side and the drain electrode side thereof.

35. (Withdrawn) A manufacturing method of a thin film semiconductor element, having a bottom gate type LDD structure, pattern-arranged on a substrate, comprising:

a gate electrode forming step for forming a prescribed gate electrode patterned on the substrate;

an upper element composing layer forming step for sequentially forming a gate insulating film, a patterned semiconductor layer and/or an underlayer insulating layer on the thus formed gate electrode;

a main mask forming step for forming a main mask directly on said gate electrode of an uppermost layer formed in said upper element composing layer forming step;

an upper mask forming step for forming an upper mask having a side poorer in masking ability upon injecting impurities as compared with the center portion at least at an end of the source electrode side and the drain electrode side by using the thus formed main mask by a method using at least photolithography and etching; and

Serial No.: 10/608,000

an impurity injecting step for injecting impurities onto said semiconductor layer from above, with the thus formed main mask and the upper mask as masks.

36. (Withdrawn) A manufacturing method of a thin film semiconductor element, having a bottom gate type LDD structure, pattern-arranged on a substrate, comprising:

a gate electrode forming step for forming a prescribed gate electrode patterned on the substrate;

an upper element composing layer forming step for sequentially forming a gate insulating film, a patterned semiconductor layer and/or an underlayer insulating layer on the thus formed gate electrode;

a main mask forming step for forming a main mask directly on said gate electrode of an uppermost layer formed in said upper element composing layer forming step;

an impurity light injecting step for lightly injecting impurities onto said semiconductor layer, with the thus formed main mask as a mask;

an upper mask forming step for forming an upper mask having a portion protruding on at least an end of the main mask on the source electrode side and the drain electrode side

Serial No.: 10/608,000

after the completion of said impurity light injecting step;  
and

an impurity injecting step for injecting impurities onto  
said semiconductor layer, by using said main mask and said  
upper mask as masks.

37. (Withdrawn) A manufacturing method of a thin film  
semiconductor element having a bottom gate type LDD structure  
according to claim 35, wherein:

said main mask forming step comprises:

a photosensitive resin layer forming sub-step for forming  
a photosensitive resin layer further on the uppermost layer  
formed in said upper element composing layer forming step;

a gate electrode corresponding exposing sub-step for  
irradiating an electromagnetic wave of a wavelength shorter  
than that of the visible beam from the side of the substrate  
having said photosensitive resin layer formed thereon with  
said gate electrode as a mask to prevent the portion of the  
photosensitive resin corresponding to said gate electrode from  
being exposed; and

a photosensitive resin non-exposure use main mask forming  
sub-step for forming said main mask by using the portion not

Serial No.: 10/608,000

exposed of said photosensitive resin in said gate electrode corresponding exposing sub-step, irrespective of whether the portion not exposed of said photosensitive resin is used as it is or another material is used for forming.

38. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate LDD structure according to claim 28, wherein:

said impurity injecting step comprises:

a bare semiconductor layer impurity injecting step for injecting impurities onto the upper surface of said semiconductor layer in the absence of an interlayer dielectric; and has:

an interlayer dielectric forming step for forming an interlayer dielectric on said semiconductor layer, after removing said main mask and said mask for LDD section, after the completion of said impurity injecting step.

39. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 30, wherein:

said impurity injecting step comprises:

Serial No.: 10/608,000

a bare semiconductor layer impurity injecting step for injecting impurities onto the upper surface of said semiconductor layer in the absence of an interlayer dielectric; and has:

an interlayer dielectric forming step for forming an interlayer dielectric on said semiconductor layer, after removing said main mask and said mask for LDD section, after the completion of said impurity injecting step.

40. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 31, wherein:

said impurity injecting step comprises:

a bare semiconductor layer impurity injecting step for injecting impurities onto the upper surface of said semiconductor layer in the absence of an interlayer dielectric; and has:

an interlayer dielectric re-forming step for forming an interlayer dielectric on said semiconductor layer, after removing said main mask and said mask for LDD section, after the completion of said impurity injecting step.

Serial No.: 10/608,000

41. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 38, comprising:

a hydrogen adsorptive metal film forming step for forming a hydrogen adsorptive metal film having a prescribed thickness on the semiconductor layer, before said impurity injecting step after said upper element layer forming step;

a hydrogen adsorptive metal film removing step for removing the hydrogen adsorptive metal film formed on said semiconductor layer except for the source electrode portion and the contact electrode portion, prior to said gate insulating film re-forming step after said impurity injecting step; and

a hydrogen adsorptive metal film using contact hole forming step for using said remaining hydrogen adsorptive metal film when forming the contact hole in the both electrode forming sections of said re-formed gate insulating film for forming a source electrode and a drain electrode.

42. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 39, comprising:

Serial No.: 10/608,000

a hydrogen adsorptive metal film forming step for forming a hydrogen adsorptive metal film having a prescribed thickness on the semiconductor, before said impurity injection step after the completion of said upper element layer forming step;

a hydrogen adsorptive metal film removing step for removing the hydrogen adsorptive metal film on said semiconductor except for the source electrode portion and the contact electrode portion, prior to said interlayer dielectric re-forming step after said impurity injecting step; and

a hydrogen adsorptive metal using contact hole forming step for using said remaining hydrogen adsorptive metal film as an etching stopper, when forming a contact hole in the both electrode forming portion on said re-formed interlayer dielectric for forming a source electrode and a drain electrode.

43. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 40, comprising:

a hydrogen adsorptive metal film forming step for forming a hydrogen adsorptive metal film having a prescribed thickness

Serial No.: 10/608,000

on the semiconductor, before said impurity injecting step after the completion of said upper element layer forming step;

a hydrogen adsorptive metal film removing step for removing the hydrogen adsorptive metal film formed on said semiconductor except for the source electrode portion and the contact electrode portion, prior to said interlayer dielectric re-forming step after said impurity injecting step and

a hydrogen adsorptive metal using contact hole forming step for using said remaining hydrogen adsorptive metal film as an etching stopper, when forming a contact hole in the both electrode forming portion on said re-formed interlayer dielectric for forming a source electrode and a drain electrode.

44. (Currently Amended) A semiconductor element having a top gate type LDD structure pattern-arranged-located on a substrate, comprising:

an upper gate electrode;

a lower gate electrode, at least a side thereof on the source electrode side and the drain electrode side protruding from said upper gate electrode, and formed-located in close contact with said upper gate electrode; and

Serial No.: 10/608,000

a semiconductor section having a channel area directly below said upper gate electrode and said lower gate electrode, an LDD area directly below a protruding portion of said lower electrode, and a source area and a drain area not covered with said upper gate electrode and said lower electrode;

said lower gate electrode comprises a low-resistance metal material having an electric specific resistance of up to 5 Ω•cm; and

said upper gate electrode comprises a high-density metal material having a density of at least 8 or a hydrogen adsorptive metal, and has a high masking ability of hydrogen ions injected during injection of impurities.

45. (Currently Amended) A semiconductor element having a top gate type LDD structure pattern-arranged located on a substrate, comprising:

a lower gate electrode;  
an upper gate electrode, at least a side thereof on the source electrode side and the drain electrode side protruding from said lower gate electrode, and formed in close contact with said lower gate electrode; and

Serial No.: 10/608,000

a semiconductor section having a channel area directly below said upper gate electrode and said lower gate electrode, an LDD area directly below a protruding portion of said lower electrode, and a source area and a drain area not covered with said upper gate electrode and said lower electrode;

said lower gate electrode comprises a low-resistance metal material having an electric specific resistance of up to 5 Ω•cm; and

said upper gate electrode comprises a high-density metal material having a density of at least 8 or a hydrogen adsorptive metal, and has a high masking ability of hydrogen ions injected during injection of impurities.

46. (Original) A semiconductor element having a top gate type LDD structure according to claim 45, wherein:

    said upper gate electrode is a plating type upper gate electrode formed by plating a metal onto the exterior surface of said lower gate electrode.

47. (Previously Presented) A semiconductor element having a top gate type LDD structure according to claim 44, wherein:

Serial No.: 10/608,000

    said source electrode and said drain electrode have:  
    a silicide layer at a contact portion with the  
semiconductor layer; and  
    a silicide forming metal layer on said silicide layer.

48.-53. (Cancelled)

54. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 44, wherein:

    said substrate comprises:  
    a TFT array substrate of a liquid crystal display unit;  
and one of said lower gate electrode and said upper gate electrode comprises:  
    a transparent conductive film because it is formed through the same process as that of the transparent conductive film of a pixel section.

55. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 47, wherein:

    said substrate comprises:

Serial No.: 10/608,000

a TFT array substrate of a liquid crystal display unit;  
and one of said lower gate electrode and said upper gate  
electrode comprises:

a transparent conductive film because it is formed  
through the same process as that of the transparent conductive  
film of a pixel section.

56. (Withdrawn) A manufacturing method of a thin film  
semiconductor element having a bottom gate type LDD structure  
according to claim 48, wherein:

said substrate comprises:

a TFT array substrate of a liquid crystal display unit;  
and one of said lower gate electrode and said upper gate  
electrode comprises:

a transparent conductive film because it is formed  
through the same process as that of the transparent conductive  
film of a pixel section.

57. (Withdrawn) A manufacturing method of a thin film  
semiconductor element having a bottom gate type LDD structure  
according to claim 49, wherein:

said substrate comprises:

Serial No.: 10/608,000

a TFT array substrate of a liquid crystal display unit; and one of said lower gate electrode and said upper gate electrode comprises:

a transparent conductive film because it is formed through the same process as that of the transparent conductive film of a pixel section.

58. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 44, wherein:

said substrate comprises:

a TFT substrate of a reflection type liquid crystal display unit; and

one of said lower gate electrode and said upper gate electrode comprises:

a satisfactorily reflective metal film because it is formed through the same process as that of a reflecting film of a pixel section.

59. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 47, wherein:

Serial No.: 10/608,000

    said substrate comprises:

        a TFT array substrate of a reflection type liquid crystal display unit; and

        one of said lower gate electrode and said upper gate electrode comprises:

            a satisfactorily reflective metal film because it is formed through the same process as that of a reflecting film of a pixel section.

60. (Withdrawn) A manufacturing method of a thin film semiconductor element having a bottom gate type LDD structure according to claim 50, wherein:

    said substrate comprises:

        a TFT array substrate of a reflection type liquid crystal display unit; and

        one of said lower gate electrode and said upper gate electrode comprises:

            a satisfactorily reflective metal film because it is formed through the same process as that of a reflecting film of a pixel section.

Serial No.: 10/608,000

61. (Currently Amended) A top gate type semiconductor element having an upper gate electrode and a lower gate electrode, ~~pattern arranged~~ located on a substrate, and formed located in close contact with each other one on top of the other on a gate insulating film, wherein:

~~one of said upper gate electrode and said lower gate electrode is:~~

~~a low-resistance electrode having an electric specific resistance of up to 5 Ω•cm because of the use of a low-resistance metal material such as Cu, Al, Ag and Au comprises a low-resistance metal material having an electric specific resistance of up to 5 Ω•cm; and~~

~~said the other lower gate electrode or said upper gate electrode is a high-density metal material having a density of at least 8 or a hydrogen adsorptive metal, and a high-masking electrode having a high masking ability of hydrogen ions injected during injection of impurities because of the use of a hydrogen adsorptive metal such as W, Mo, Co, Ta, Au, Nb or Ag.~~

62.-63. (Cancelled)

64. (Currently Amended) gate type semiconductor element pattern arranged located on a substrate, having gate electrodes comprising an upper gate electrode and a lower gate electrode formed located one on top of the other in close contact with each other on a gate insulating film, wherein:

~~one of said upper gate electrode and said lower gate electrode is a low resistance electrode having an electric resistance of up to 5 Ω·cm because of use of a low resistance metal material such as Cu, Al, Ag or Au comprises a low-resistance metal material having an electric specific resistance of up to 5 Ω·cm; and~~

~~said the other gate electrode or upper gate electrode is comprises a high-density metal material having a density of at least 8 or a hydrogen adsorptive metal, and a high-masking electrode having a high masking ability of hydrogen ions injected during injection of impurities because of use of a high-density metal material such as W, Mo, Co, Ta, Au, Nb or Ag, or a hydrogen adsorptive metal such as Zr, Ti or a Ti-based metal.~~

65. (Original) A semiconductor element having a top gate type LDD structure according to claim 64, wherein:

said source electrode and said drain electrode comprises:  
    a silicide layer at a contact portion with the  
semiconductor layer; and  
    a silicide forming metal layer on said silicide layer.

66. (Cancelled)

67. (Currently Amended) A substrate wherein:  
    said substrate is provided with an LDD type TFT in  
response to properties required, because the LDD type TFT is  
required to have different properties, depending upon a  
position on said substrate, as in a substrate having a pixel  
section and a driving circuit section surrounding the same  
integrally formed therewith, comprises:

    a two-stage structure gate electrode comprising an area  
on the substrate comprises a lower gate electrode, in which an  
upper gate electrode, and at least one of the source electrode  
side and the drain electrode side protrudes from said upper  
gate electrode, ~~formed located~~ in close contact with said  
upper gate electrode, or ~~on the contrary,~~ in which a lower  
gate electrode, and at least one of the source electrode side  
and the drain electrode side protrudes from said lower gate

Serial No.: 10/608,000

electrode, formed in close contact with said lower gate electrode;

a semiconductor portion having a channel area directly below said upper gate electrode and said lower electrode, an LDD area directly below the protruding portion of said upper electrode or said lower electrode, and a source area and a drain area not covered with said upper gate electrode and said lower electrode; and

said lower gate electrode comprises a low-resistance metal material having an electric specific resistance of up to 5 Ω•cm; and

said upper gate electrode comprises a high density metal material having a density of at least 8 or a hydrogen adsorptive metal, and a high-masking electrode having a high masking ability of hydrogen ions injected during injection impurities,

the other areas or some of the other area on the substrate comprise:

a two-stage columnar-shaped gate electrode comprising an upper gate electrode and a lower gate electrode formed in close contact with said upper gate electrode, and none of the upper and lower gate electrodes have a protruding portion, or

Serial No.: 10/608,000

a gate electrode serving also as a complete mask upon injecting impurities comprising a single gate electrode; and has:

a semiconductor section having a channel area directly below said gate electrode serving also as a complete mask upon injecting impurities, an LDD area on at least one of the source electrode side and the drain electrode side of said channel area, and source area and drain area at both ends of these areas.

68.-69. (Cancelled)

70. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure, which is pattern-arranged on a substrate, comprising:

a gate electrode forming step for forming a gate electrode having a prescribed shape on a gate insulating film formed on the semiconductor layer patterned on the substrate;

an etching mask forming step for forming a side serving as an etching mask upon removing said gate insulating film on at least a side of the source electrode side and the drain

Serial No.: 10/608,000

electrode side, by use of the thus formed gate electrode, in close contact with the gate electrode;

a gate insulating film removing step for once removing the gate insulating film except for the portion directly below, by using the thus formed gate electrode and a side etching mask as etching masks;

an injecting step for injecting impurities by using the said gate electrode, the gate insulating film present thereunder, or in addition, the side etching mask of the gate electrode as masks; and

a gate insulating film re-forming step for forming again the gate insulating film at the removed portion.

71. (Withdrawn) A manufacturing method of a thin film semiconductor element having a top gate type LDD structure according to claim 70, wherein:

said etching mask forming step is an etching mask forming step using plating for depositing a prescribed metal by plating with a gate electrode as an electrode.